

create the highest quality user experience with Windows® on AMD processor-based platforms. These practices include the creation of an internal team to help ensure support for the features of AMD processors and platforms in all Microsoft product lines, deploying AMD systems in Microsoft build-and-test labs, and aggressive seeding of early hardware to Microsoft compatibility and development teams.

AMD processors are designed to be compatible with x86 industry-standard software, including the installed base of Microsoft® Windows compatible software and operating systems. The bottom line is that if it's from AMD, it's compatible.



INFORMATION BRIEF

AMD and Compatibility: Putting it Together

AMD's Commitment to Quality

Compatibility is an extremely complex issue in the microprocessor industry. Testing each processor model on every combination of application software, operating system, and system configuration is a relative impossibility. In order to serve best the needs of its customers and partners, AMD focuses great attention at the very first stages of the development process. The earlier a compatibility issue can be identified the better for everyone involved.



Compatibility by Design

AMD processors are designed according to industry standard specifications for x86 instruction sets, which allows for universal compatibility with x86 application software and operating systems. The x86 standards

are rigid specifications to which AMD adheres throughout the design and testing of its products.

AMD's primary responsibility during the design phase of processor development is to provide compatibility through millions of

About AMD

AMD is a global supplier of integrated circuits for the personal and networked computer and communications markets with manufacturing facilities in the United States, Europe, Japan, and Asia.

AMD, a Fortune 500 and Standard & Poor's 500 company, produces micro-processors, flash memory devices, and support circuitry for communications and networking applications.

Founded in 1969 and based in Sunnyvale, California, AMD had revenues of \$4.6 billion in 2000. (NYSE:AMD)



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Each year, AMD provides thousands of systems to developers working on applications for the x86 standard to enable compatibility in the ISV community.

simulations of the instructions that will one day make up the infrastructure of the processor. Before any silicon is involved, before a single wafer or chip is produced, a software version of a processor is created. Thousands of networked computers are then used to host this software model. The first level of innovation that AMD applies to check the foundation of its processors is the writing of mini-applications to be run on the simulation model. These mini-applications are directed at specific areas of functionality. They test for some of the same types of executions found in commercially available software.

The second level of innovation used to make sure that processor code meets established industry standards involves the use of a Golden Model check at every instruction boundary. A Golden Model is essentially the simplest model of a processor that implements the x86 standard instruction set. AMD engineers use this Golden Model by running it in parallel with the real, more complex model. They then check for consistency between these two models at all possible intermediate points in a simulation.

Third in the design compatibility process, AMD engineers utilize an automated

system that generates thousands of random tests. The Golden Model is then used to flag problems generated when running these random tests on the software version of the processor. Millions upon millions of unique cycles are able to run each night, which far exceeds the boundaries and limitations of a test engineer manually writing and verifying tests.

Compatibility by Test

Once silicon for the processor is delivered from the Fab, mass testing of the physical device begins. Real silicon has orders of magnitude and more throughput than a simulation model, but less controllability of the interfaces and less visibility into the execution details. Many of the same tests from the design phase are repeated on the actual silicon. The added throughput of the design verification tests offers an opportunity to catch the last few problems or bugs that may not have been as easy to locate before the chip was created.

The testing phase is largely focused on getting the first samples to the Processor Validation Lab. Here chips are run with several different operating systems and applications in order to check for specific

AMD’s Commitment to Quality

- Compatibility by Design
- Compatibility by Test
- Compatibility by Platform
- Compatibility by ISV (Independent Software Vendor)

types of execution compatibility. Processor validation engineers are constantly designing new ways to check hundreds of applications and scores of operating systems, even versions that are well out of date. Rather than testing each piece of software in depth (which would be a huge, impractical task), AMD focuses on taking a thin slice from a vast application/OS pool.

Compatibility by Platform

Next, silicon samples go to the Platform Validation Lab. Even the most powerful processors in the world are useless if they don’t work in a system. This phase of testing relies heavily on the industry standards adhered to by AMD’s “complementors”—manufacturers who build associated components such as chipsets and motherboards. While the initial objective of the Platform Validation Lab is to validate chipsets, it is

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also crucial to test a broad selection of third-party platform components to determine a processor’s compatibility in various configurations. The lab operates to validate motherboard implementation, to test electrical systems and BIOS, to complete stress and stability tests, and to try out a variety of hardware on ports and interfaces. During this phase, engineers also determine which types of critical components (power supplies, heat sinks, memory) work best in conjunction with the AMD processor under evaluation.

Compatibility by ISV (Independent Software Vendor)

Application software tends to be at the center of most end users’ compatibility concerns. The challenge for AMD engineers in this case is how to test the vast multitude of x86 applications for processor compatibility.

Each year, AMD provides thousands of systems to developers working on applications for the x86 standard to enable compatibility in the ISV community. At the cornerstone of this initiative is AMD’s relationship with Microsoft. AMD is committed to working with Microsoft to